

### **ABSTRACT OF THE DISCLOSURE**

Analysis of an electrical circuit is performed using a computer program product (60) and a method. In accordance with the program and the method, a electrical circuit analyzer generates an admittance matrix for an electrical circuit which is being  
5 analyzed. The admittance matrix includes symbolic expressions rather than numerical expressions for at least some components of the electrical circuit. The electrical circuit analyzer linearly and algebraically solves an equation system including the admittance matrix for analyzing at least a part of the electrical circuit. The electrical circuit analyzer uses symbolic computation to solve the equation system including the  
10 admittance matrix for analyzing at least a part of the electrical circuit. The equation system including the admittance matrix can be solved in various types of analyses, including (1) determining a transfer function between specified nodes of the electrical circuit; and (2) optimizing a component of the electrical circuit. The electrical circuit analyzer sets up the admittance matrix  $Y$  by following a set of "rules". Special rules are  
15 provided for certain telecommunications components, such as multi-winded transformers, loading coils, line-drivers, analogue cables, and filters. Inclusion of these special rules for telecommunications components enables the electrical circuit analyzer to be more applicable to telecommunications circuits than conventional analyzers. In accordance with a block/subcircuit matrix approach, an overall circuit is divided into  
20 plural subcircuits. In such case, the admittance matrix can comprise separate admittance blocks for each of plural subcircuits. Connectivity blocks which represent connectivity between the plural subcircuits are situated on a cross diagonal of the admittance matrix. The admittance matrix can then be conveniently utilized for analyzing at least a part of the electrical circuit. Advantages of this approach include  
25 recursively reducing the size of the matrices including the admittance matrix as subcircuits are added to the admittance matrix.